REMARKS

By an Office Action dated June 28, 2001 in the file of this application the Examiner objected to the patent application for a variety of grounds. Based on this submission, reconsideration of the merits of this patent application is respectfully requested.

First the Examiner continues to impose a requirement for restriction. The applicant continues to traverse this requirement. Contrary to the statement of the Examiner, the applicant believes that the subject matter of SEQ IDS NO. 1 and 3 are very related. In fact, as stated in the specification of this application (page 7), the proteins encoded by these two genes have a 92% sequence identity. These are analogous genes from different plants. Although the two DNA sequences are to some degree different, they are very highly related, and represent the same invention. Any search of the subject matter of the sequence of either of these genes should encompass subject matter related to the other. It is therefore believed that this requirement for restriction is improper and inappropriate in this case. In this regard, please note that the applicant has added structural limitations to the claims of this case relating to the sequence of the DNA sequences claimed and the transgenic plants claimed in this case. Furthermore, those limitations would cover both sequences, SEQ ID NO:1 and SEQ ID NO:3. This is intentional and appropriate.

The first ground of objection in the Office Action was an objection to Claims 1 and 14 for bad grammar. The Examiner's point was well taken and the grammar has been corrected.

The Examiner imposed a rejection to Claim 8 on the grounds that it did not say that the DNA was purified. This position by the Examiner was also well taken, and the claim has been appropriately amended.

On page 4 of the Office Action are a series of rejections under §112, first paragraph. The applicant believes that all of these rejections were without proper foundation as made, but are now clearly without foundation given the limitations that the applicant has made to the claims of this application.

The applicant here has made what is clearly a novel discovery. The novel discovery is that the MinD genes in plants are an essential part of plastid division. That discovery makes possible the general manipulation of plastids in plant cells. The applicant has further demonstrated that the genes are all structurally related, and that they encode proteins having a high degree of sequence similarity, in excess of 50% at the amino acid level. This opens the

door to a broad range of plastid manipulation in transgenic plants and represents a significant contribution to plant genetic science.

The Examiner asserts, on page 4 of the Office Action, that the specification is only enabling for an *Arabidopsis* MinD gene encoding SEQ ID NO:2. The applicant strenuously disagrees. The tools described in this patent application allow the identification of a MinD gene from any plant. The Examiner's attention is drawn to the fact that the applicant identified the MinD sequence in *Arabidopsis* using sequence identification from plastid division genes from prokaryotic organisms. The applicant also identified subsequent MinD genes in another plant, i.e. the MinD sequence from *Tagetes*, using sequence similarity searches. It is therefore evident that sequence similarity analysis can reveal similar MinD genes in any plant species for which genetic information is available. Note that the claims have been amended so that they do not cover any theoretical plant MinD gene, but only cover those plant MinD genes that have a defined level of sequence similarity, at the amino acid level, with SEQ ID NO:2. These claims therefore cover a representative sample of MinD genes from plants and provide a scope commensurate with the invention that the applicant has enabled. Furthermore, the claims have a structural limitation within them and define structural components of the genes, plants, and gene constructs in question. Accordingly, the claims are properly enabled and of proper breadth under §112, first paragraph.

Similarly the Examiner objected to the claims, on page 6 of the Office Action, for overbreadth on the grounds that only plastid manipulation in *Arabidopsis* is taught in the patent application. While it is true that the applicant's experimental data was performed in *Arabidopsis*, a common experimental organism in plant genetic engineering, the teaching of the specification is clearly that the same phenomenon can be made to work in other plants. Note that since MinD genes can readily be isolated from other plants, it is possible either to use an *Arabidopsis* MinD gene, or a native MinD gene from a given plant species, to genetically engineer that plant species. The insertion of sense or antisense MinD genes in any plant is enabled by the teachings of the specification.

On page 8 of the Office Action, the Examiner objected to the claims under §112, first paragraph, on the grounds of overbreadth arguing that the claims were broadly drawn to a multitude of DNA molecules that include a MinD protein of any sequence and from any source. The applicant has amended all of the claims of the application to recite specifically that the MinD genes encoded protein having a sequence identity of at least 50% with SEQ ID

NO:2. It is believed that this limitation provides structural definition to the MinD genes claimed in this patent application and overcomes any rejection of the type made by the Examiner in this portion of the Office Action.

Page 9 of the Office Action contains a rejection under §112, second paragraph for indefiniteness on the grounds that the claimed subject matter includes non-elected subject matter. The applicant's claims are generic and include material beyond the scope of SEQ ID NO:1. This is intentional and not indefinite. It is not understood how a §112, second paragraph, can be made on this basis.

The Examiner did correctly point out indefiniteness in both Claims 11 and 27. Those instances of indefiniteness have been corrected by the applicant here.

On page 9 of the Office Action is another rejection under §112, second paragraph, pointing out that the method claims should end in the production of plant cells with an altered size shape and/or number of plastids. An amendment to the claim has been done to conform with this requirement.

On page 10 of the Office Action is a rejection under §102(b) on the grounds that Claims 8, 27 and 28 are anticipated by Sato. The applicant respectfully traverses this rejection.

First, as evidence of sequence identity, the Patent Office has supplied to the applicant a computer generated report from probing of a sequence data base. That report states, on its face that "On August 9, 2000 this sequence version replaced the gi:2656032." In other words, the very citation made by the Examiner is to a sequence which was inserted in the data base only on August 9, 2000. No information is available in this citation as to what sequence had been published prior to the filing date of this patent application. There is no actual sequence data in the cited Sato paper.

Secondly, please note that this case claims priority from a provisional application filed April 19, 1999. It has not been established that the sequence was in the data base more than one year before the filing date of the provisional application from which this case claims priority. The Sato paper itself is only dated 1998.

Based on the foregoing, reconsideration of the merits of this patent application is respectfully requested. A separate petition for extension of time is submitted herewith so that

this response will be considered as timely filed.

Respectfully submitted,

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

Applicant: Katherine W. Osteryoung

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Group Art Unit: 1638

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Examiner: A. Kubelik

Title: MANIPULATION OF MIN GENES IN PLANTS

File No.: 920905.90041

1. (Amended) A transgenic plant comprising in its genome an [artifical] artificial genetic construct comprising a sense or antisense MinD protein coding sequence and a promoter which promotes expression of the MinD protein coding sequence in cells of the plant, wherein expression of the sequence in the plant [cause] causes alteration in the size, shape and/or number of plastids in plant cells of the plant as compared to non-transgenic plants of the species, the MinD protein encoded by the protein coding sequence having at least a 50% sequence identity with SEQ ID NO:2.

8. (Amended) [A] An isolated DNA sequence comprising the sequence of SEQ ID NO:1.

11. (Amended) A plant comprising in its genome a transgene comprising a sense or antisense MinD gene which causes the plant to have an altered number of plastids as compared to plants of the same species [with] without the transgene, the MinD gene encoding a protein having at least a 50% sequence identity with SEQ ID NO:2.

14. (Amended) A plant seed comprising in its genome a genetic construct comprising a sense or antisense MinD protein coding sequence and a promoter, not natively associated with the MinD protein coding sequence, which promotes expression of the MinD protein coding sequence in the plant, wherein expression of the sequence in the plant [cause] causes alteration in the size, shape and/or number of plastids in plant cells of the plant as compared to nontransgenic plants of the species, the MinD gene encoding a protein having at least a 50% sequence identity with SEQ ID NO:2.

20. (Amended) A genetic construct comprising a MinD protein coding sequence in either a sense or antisense orientation and a promoter that promotes expression of the sequence in plants, the promoter not being natively associated with the protein coding sequence, the MinD gene encoding a protein having at least a 50% sequence identity with SEQ ID NO:2.

24. (Amended) A method for altering the size, shape and/or number of plastids in plant cells comprising the steps of constructing a genetic construct comprising a MinD protein coding sequence in either sense or antisense orientation and a promoter, not natively associated with the MinD protein coding sequence, which promotes expression of the MinD protein coding sequence in plants, introducing the genetic construct into a plant, selecting a plant that has received a copy of the genetic construct, and growing the plant under conditions that allow expression of the gene, the plant having altered size shape or number of plastids, the MinD gene encoding a protein having at least a 50% sequence identity with SEQ ID NO:2.

27. (Amended) A DNA sequence isolated from its native genome, the isolated DNA sequence comprising a plant MinD gene, the MinD gene encoding a protein having at least a 50% sequence identity with SEQ ID NO:2.